

OBSERVATIONS ON THE BREEDING BIOLOGY OF THE VERMILION FLYCATCHER IN ARIZONA

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DURING the period 6 April to 2 June 1967 we made observations on three nesting pairs of Vermilion Flycatchers (*Pyrocephalus rubinus*), two of which had second broods. Two additional pairs were in the area as well as a territory holding male, of much lighter coloration, that was believed to have never mated. None of the flycatchers were marked for individual identification.

Our observations were made in a well-developed mesquite (*Prosopis juliflora*) floodplain woodland locally known as Coon's Bluff Recreational Area, in Tonto National Forest, approximately 16 miles northeast of Mesa, Maricopa County, Arizona. Typical Lower Sonoran desert vegetation occupies adjacent upland regions.

HOSTILE BEHAVIOR

A few instances of prolonged conflict and aggressiveness between two flycatchers were observed. On 8 April at 07:30 the male of pair one and the light-colored unmated male chased each other for approximately 10 minutes. The mated male, evidently defending his territory, was the more aggressive individual. He made several short pursuit flights at the unmated male who invariably retreated. At the termination of each chase, the two males perched 10 to 20 feet apart. Their crown feathers were erect. The tail was spread, hanging downward, and was frequently flicked. Each emitted a loud, sharp *peent* note (see below). Occasional loud bill snapping sounds were produced, but the Gape Display mentioned by Smith (1967) was not seen. Evidently, the light-colored male was both the intruder and loser.

Once a male flycatcher terminated a flight display to chase a Violet-green Swallow (*Tachycineta thalassina*) in flight nearby. Lucy's Warbler (*Vermivora luciae*) was driven from the nest site by both sexes on three occasions. Once a male flycatcher chased a female Audubon's Warbler (*Dendroica auduboni*) from the nest tree. Brandt (1951) cited an incident of a male flycatcher attacking a male House Finch (*Carpodacus mexicanus*), but we found a pair of House Finches and flycatchers nesting in the same mesquite. On another occasion, however, the male flycatcher of a different pair chased a singing male finch from a nest with nestling flycatchers.

VOICE

Four distinct vocalizations were recognized. The primary functional significance of each is believed to be understood.

Song—The song is produced repeatedly by the male during the elaborate display flight. The song sounds like the words *pur-reet* with the first portion consisting of rapid repeated rolling notes. On infrequent occasions, perched males gave the same or at least portions of a similar song throughout the day. The song is produced by mated and unmated males.

Peent note—This is the typical call of the species and is commonly produced by both sexes. Each *peent* note is sharp sounding and loudly or softly given, depending upon the circumstances. It was produced by disputing males and by both sexes during displacement activities. In these circumstances, the individual notes were loud. The male used this call when he arrived to feed the incubating or brooding female. In these instances, the individual notes were not nearly as loud as during the disputes.

Feeding notes—These notes sounded as softly, quickly produced *piks* given by adults when feeding nestlings and probably alert the nestlings of the parent's presence.

Nestling notes—These peeping sounds were produced by disturbed nestlings. They were given at a rapid rate and are quite loud from the first day of hatching.

NESTING BIOLOGY

Nest building—The female built the nest but the male on several occasions accompanied her to the building site. A nest was found under construction on 6 April. Two days later the female was actively building on the structure. In another nest located 8 April shortly after construction had begun, an additional four days elapsed before the first egg was laid. Newly-constructed nests were used in the two cases of second nestings. Materials from one of the first nest were used in building the second structure.

Clutch size and egg-laying—Four clutches of three eggs and one of two eggs were observed. In two nests, the eggs were not laid on consecutive days.

Incubation period—Bent (1942) stated the incubation period as about 12 days and Wheelock (1904) gave 12.5 days required for the incubation of three eggs. In three nests we observed the incubation period (elapsed time between laying of the last egg to hatching of that egg) was 14 to 15 days. The clutches were incubated during late April.

Incubation behavior—Incubation was performed by the female, but, the male of one pair on two occasions entered the nest for less than one minute. Once the female chased the male away shortly after he entered the nest. In both instances, the male definitely did not remain in the nest long enough to incubate nor could we see any evidence of an incubation patch on the male. The presence of this structure could easily be detected on the female. Bendire (see Bent, 1942) stated that "the male assists [in incubation] to some extent,

as I have on two occasions seen one sitting on the eggs." Possibly his observations are comparable to our observations described above.

In two pairs the female spent an appreciable amount of time on the nest before the clutch was completed. The length of time on the nest during these periods was typically short, but frequent. Davis, Fidler, and Davis (1963) found that the female Western Flycatcher (*Empidonax difficilis*) spent considerable time on the nest before the clutch was completed.

During incubation and brooding, the males of pairs one and three brought food to the incubating female on the nest. This behavior never occurred in pair two during 210 minutes of observations spaced throughout incubation. The male of pair two, however, like the other males, fed the female off the nest. Feeding of the female by the male occurred with a slightly higher frequency on than off the nest. The male usually perched a short distance from the nest when he came to feed the female. He then gave *peent* notes which obviously announced his presence; he would spread his tail as it hung down and suddenly fly to the female. The male quickly deposited the food into the female's mouth and flew away. Sometimes the female gave subdued *peent* notes when the male appeared with food. She usually remained on the nest after these feedings; occasionally she left with the male. At times, the male did not go to the nest and the female flew to him and took the food. Copulation was frequently observed after these feedings. Twice the male with food flew straight to the nest while the female was absent. On both occasions, the female suddenly appeared and flew to the male at the nest. Both birds fluttered about as the male fed the female. After these feedings, they flew from the nest. The female never begged for food during any of these feedings.

The female often brought nesting materials when returning to incubate. She typically went to and from the nest alone, silently, and in a direct manner. She frequently terminated attentive periods to pursue nearby flying insects. The female's time spent off the nest was devoted to hawking insects near the nesting area.

In 424 minutes observing pair three, with nestlings 1 and 3 days old, the female had 43 attentive periods ranging from 20 seconds to 17.5 minutes. The mean time spent on the nest was 6.4 minutes and the percentage of attentiveness was 63. The mean inattentiveness through a total of 38 inattentive periods for this female was 4.8 minutes and ranged 20 seconds to 15 minutes. During 110 minutes observing another nest with one nestling that hatched that morning, the female had eight attentive periods ranging from 1 to 26 minutes. The mean time spent on the nest was 11 minutes and the percentage of attentiveness was 80. The mean inattentiveness through a total of seven inattentive periods for this same female was 3.1 and ranged 1 to 6 minutes. One incubat-

ing female remained on the nest for 39 consecutive minutes. This was the longest period any incubating or brooding female spent on the nest. The male did not feed the female during the 39-minute period.

The female of pair three nested about five feet from the edge of a sandy road frequently used on weekends by hikers and passing automobiles. During early incubation, a person or dog walking by the tree caused the female to immediately leave the nest; however, she remained on the nest if a car passed. After heavy incubation began, passing individuals and dogs seldom disrupted her incubation activities.

Hatching—In one nest with three eggs, hatching extended for two days. The third egg did not hatch and remained in the nest with the two nestlings for at least five days.

The nestling flycatcher at hatching has tufts of creamy-colored feathers in various areas of the dorsal portion of the body. The nestlings characteristically contain a considerable amount of blackish pigment, especially on the dorsum. Dawson (1923) said "the chicks are black for a few days after hatching, with some outcropping of white down." We, however, cannot agree entirely with Wheelock's (1904) statement that the young flycatcher at hatching is salmon-pinkish in color. Two nestlings weighed 1.1 and 1.5 grams on the day of hatching.

Parental care of the nestlings—Both sexes fed the nestlings. The male and female fed the young 11 and 8 times, respectively, during 185 minutes at one nest with two nestlings, the oldest two days of age. The female continued to brood the young in the early stages of nest life. The male often fed the brooding female in the same manner as during incubation. She would eat or pass the food to the nestlings by raising up in the nest giving the feeding notes. The frequency of feedings of the female by the male diminished after the young were present. In one nest with three nestlings, the female and the male made 6 and 4 trips, respectively, during 64 minutes of observation in the late morning. In another nest, the female made only two feedings in 110 minutes to the one nestling that had hatched that morning. Both feedings occurred as the female began an attentive period. The male flycatcher did not feed the nestlings or the female during this period.

Both sexes removed fecal sacs. At a nest with two young (0 and 2 days old), the male and female each removed and ate three fecal sacs during 122 minutes of observations.

Observations of the later phases of the nesting activities were limited since two of the first nests were disrupted by unknown causes. One nest had its contents (two well-developed nestlings and one unhatched egg) completely removed, although the structure remained in perfect condition. The other

nest was abandoned for unknown cause the day two eggs hatched. The young lay dead in the nest along with an unhatched egg, but the adults were observed in the area. A second nest of the pair was under construction 6 May, four days after discovery of the dead young.

SUMMARY

A study was made of breeding activities of Vermilion Flycatchers in a mesquite woodland, near Mesa, Maricopa County, Arizona. Hostile behavior in territorial defense is described. Four distinct vocalizations were recognized; the song is a function of the male. Data on nest building, clutch size, egg-laying, incubation period and behavior, hatching, and parental care of the nestlings are given.

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PUBLICATION NOTES AND NOTICES

IDENTIFICATION GUIDE TO EUROPEAN PASSERINES. By Lars Svensson. Naturhistoriska Riksmuseet, Stockholm, Sweden. 1970: $4 \times 7\frac{1}{8}$ in. 152 pp. many text figs. 15 Swedish Kroner.

A pocket guide to identification, sexing, and aging of birds for banders, and those studying museum skins. Approximately 15 North American species are included.

BIRDS OF THE BOZEMAN LATILONG. By P. D. Skaar. Privately published, 1969: $8\frac{1}{2} \times 11$. 132 pp., mimeo, no price given. (Obtainable from P. D. Skaar, 501 S. Third St., Bozeman, Montana.

An annotated list of 277 species listed between 45° and 46° N latitude and 111° and 112° W longitude (latilong).

CALIFORNIA BIRDS—(A new periodical). Published by the California Field Ornithologists, Clifford R. Lyons, Treasurer, 6424 Mt. Adelbert Drive, San Diego, California 92111. Annual dues \$5.

This is a most welcome addition to the list of state ornithological journals for a state with a large body of active bird students. Volume 1, No. 1, 1970 contains an updated checklist of the Birds of California.